LOW-LEVEL RADIOACTIVE WASTE REGULATION AND EXEMPTION PRACTICES IN THE UNITED KINGDOM

G. N. Macro, J. O. McHugh, R. E. Smith, C. J. Weedon and C. R. Williams
Her Majesty's Inspectorate of Pollution
UK

ABSTRACT

Her Majesty's Inspectorate of Pollution (HMIP) has responsibilities for regulating the keeping and use of radioactive materials, and the disposal of radioactive wastes, in England and Wales. The legislation enforced by HMIP includes the Radioactive Substances Act 1993. Exemption Orders made under the Radioactive Substances Act provide the possibility of free release of some wastes, and conditional release of others. This paper describes the regulatory framework for control of radioactive waste, and the UK approach to exemption of waste of low radiological significance from full control under this legislation, whilst retaining a degree of regulation.

UK LEGISLATION AND REGULATORY BODIES

There are three principal Acts of Parliament which are relevant to radioactive waste regulation in the United Kingdom. These are the Radioactive Substances Act, the Nuclear Installations Act, and the Health and Safety at Work Act. These Acts are all enforced by Central Government Inspectorates. The present paper focuses on Her Majesty's Inspectorate of Pollution's (HMIP's) regulation of premises other than those operated by the nuclear industry, in accordance with the **Radioactive Substances Act** and "Exemption Orders" made under that Act. The more complex regulatory regime applying to nuclear sites is identified elsewhere (1).

The use of radioactive materials, and the disposal of solid, liquid and gaseous radioactive wastes, are subject to the provisions of the **Radioactive Substances Act 1993 (RSA93)** (2). While this is a recent piece of legislation, it consolidated an earlier Act (The Radioactive Substances Act 1960) (3) with some amendments made by the Environmental Protection Act 1990 (4). There is therefore a long-established system under which the disposal of radioactive wastes is regulated.

HMIP enforces RSA93 in England and Wales. Similar arrangements exist in Scotland, and are administered by HM Industrial Pollution Inspectorate (HMIPI) of the Scottish Office.

CERTIFICATED USES OF RADIOACTIVE MATERIALS AND DISPOSALS OF RADIOACTIVE WASTES

Unless an operator can comply fully with one or more of the exemption provisions mentioned below (comprising exemptions within RSA93 itself, and Exemption Orders made under the Act), then that operator must be "registered" under RSA93 to keep and use radioactive materials, and "authorized" under RSA93 to accumulate and dispose of radioactive wastes. Regulatory *control is* exercised at each premises through certificates of registration and authorization which are issued by HMIP to the operators.

There are some 1000 premises in England and Wales which are authorized under RSA93 to dispose of radioactive wastes. A range of disposal practices have been authorized during the past 30 years, and have been kept under review to ensure that they continue to comply with modern radiological standards. Disposal routes for solid wastes include regulated dispersal with ordinary trash and controlled burial at specified landfill sites. Small quantities of *liquid wastes* are usually authorized for disposal to sewer. A combination of standard conditions of authorization and site-specific release limits are applied. The "limited Below Regulatory Control (BRC) Rulemaking" which is being adopted in the USA is therefore similar to the established regulatory practices in the UK. Authorizations typically contain limits on the radioactive content and quantities of wastes for disposal, conditions specifying the means of disposal and requirements for record keeping and monitoring.

Under RSA93, HMIP's Inspectors are responsible for:

a. ensuring that the operator has adequately assessed the radiological implications of disposal and discharges;

b. ensuring that the operator has provided appropriate means to limit and control discharges; ensuring that the operator will be able to use the means of control provided during all stages of the operation of the plant and shall either provide suitable alternative means or be readily able to terminate any process and the associated discharges; and

c. ensuring that the operator will be able to assess or measure discharges accurately during all phases of operation.

EXEMPTION ORDERS

Origin of Exemption Orders in the UK

The need for Exemption Orders (EOs) has been recognized for many years in the UK. The Radioactive Substances Act was introduced in 1960 following the recommendations of a Government Advisory Panel (5) and is concerned with protecting the public and the environment in relation to the use and disposal of radioactive substances. The recommendations of the Panel, implemented in the 1960 Act and confirmed in a subsequent review (6), were the prohibition of use of radioactive materials except by registered users and the requirement that authorizations must be obtained for accumulation and disposal of radioactive waste. The Panel further recommended that powers should be provided to exempt minor uses from registration and minor disposals from authorization.

The recommendation on exemption was implemented in the legislation by:

a. Incorporating a Schedule in the Act itself, which specified concentration figures for certain naturally occurring radioactive elements, below which a material would not be regarded as radioactive for the purposes of the Act;

b. Empowering the relevant Government Minister to exempt radioactive material and waste by Order; and

c. Exempting the keeping and use of luminized clocks and watches (but not their manufacture or repair).

The basic approach to exemption in the UK has remained unchanged from 1960 to the present day.

Responsibilities & Legal Status

The Secretary of State for the Environment is responsible for issuing EOs. EOs are prepared by the Department of the Environment Radioactive Substances (Policy) Division, with HMIP providing technical advice as required. EOs are issued as Statutory Instruments, having the force of law under the Radioactive Substances Act. An EO may revoke previous EOs.

Considerations in Determining Whether to Issue an EO

An EO is not issued simply because there is demand for it. Three general considerations are that:

a. The machinery of registration/authorization should not be applied for its own sake;

b. By exempting minor uses and disposals of radioactive materials, greater effort can be directed towards more important cases; and

c. Limitations and conditions can be imposed by an EO so as to provide, in effect, a code of safe practice.

In determining whether to issue a particular EO, some more specific considerations are:

i. Whether the practice is widespread or likely to become so.

ii. Whether the practice is justified, i.e. whether the benefits outweigh the detriments.

iii. Any need for specific controls to avoid harm and to optimize the practice.

iv. Allied to iii., any significant need for the regulators to monitor the practice.

The UK approach to EOs is consistent with the three main principles of ICRP, namely, justification of the practice, optimization and dose limitation.

Introduction of Individual EOs & Current List

For a single case or a few similar cases of a practice involving use/disposal of radioactive material, it is convenient to consider registration/authorization. However, some practices or products involving radioactive material are very widespread. These include cases in which the radioactivity is an essential property (e.g. smoke detectors) and cases in which radioactivity is an unavoidable concomitant (e.g. phosphate fertilizers). Application of registration/authorization in these cases would not only be a massive administrative burden on HMIP but would be liable to discourage the application of a useful practice or product.

Generally, EOs have been introduced where:

a. A widespread use or disposal of small quantities of radioactive material exists or is envisaged; and

b. Either the use of radioactivity is justified or its presence is unavoidable; and

c. The radiological hazards can be shown to be negligible, or can be made negligible by observing conditions specified in the EO.

Individual EOs are provided as the need is perceived: historically, they have usually been prompted by a request from an undertaking which would wish to make use of the EO in its work. Each EO is prepared after detailed consideration of the practice or group of practices which it is intended to cover, although EOs are often framed in general terms so that very similar practices or products containing radioactivity will also be exempted. In particular, specific attention is given to

TABLE I
List of Exemption Orders Currently in Effect

Date	Statutory Instrument No.	Subject
1962	2645	Exhibitions
1962	2646	Storage in Transit
1962	2648	Phosphatic Substances, Rare Earths, etc.
1962	2649	Lead
1962	2710	Uranium and Thorium
1962	2711	Prepared Uranium and Thorium Compounds
1962	2712	Geological Specimens
1963	1831	Waste Closed Sources
1963	1832	Schools, etc.
1963	1836	Precipitated Phosphate
1967	1797	Electronic Valves
1980	953	Smoke Detectors
1985	1047	Gaseous Tritium Light Devices
1985	1048	Luminous Articles
1985	1049	Testing Instruments
1986	1002	Substances of Low Activity
1990	2512	Hospitals
1991	477	Smoke Detectors (Amendment)
1992	647	Substances of Low Activity (Amendment)

whether the practice is justified and, where necessary, conditions are placed (e.g. on quantities or mode of disposal) in order to limit radiological impact. In determining the conditions applicable to an EO, consideration is given to optimization of the practices concerned. Both artificial and natural radionuclides are the subject of EOs in the UK.

The current list of EOs, which has developed over a period of more than 30 years, requires regular review to ensure consistency and to discontinue exemption of practices which are now regarded as inappropriate or obsolete. Table I gives the list of EOs currently in force. Two EOs have been amended in recent years following reviews.

A wide-ranging review of EOs was carried out in 1987 (7).

Status of Exempted Practices in the UK

In the UK, exemptions are permitted **under** the legislation rather than **from** the legislation. In other words, the legislation still applies to the exempted practice: this means, for example, that HMIP can prosecute an operator for use of radioactive material without a registration or disposal of radioactive waste without an authorization, if that operator fails to comply with an EO. It would otherwise be necessary for undertakings to obtain registration or authorization for relatively trivial practices. The UK position, namely that exempted practices still remain under the legislation and are therefore subject to some degree of regulatory control, differs from the general position internationally.

Style of EOs

EOs in the UK are tailored to the specific practice or group of practices being exempted. This means, for example, that the way the activity limits are specified (e.g. in terms of concentration or total quantity) varies to suit the practice.

An EO may be unconditional or conditional. Conditional EOs usually permit higher activity levels than unconditional EOs. The one for substances of low activity is unconditional, whereas the one for hospitals is conditional. These two EOs are now briefly discussed.

Typical EOs

The EO for **substances of low activity** is a general EO relating to certain kinds of material. It exempts from registration and authorization radioactive substances which possess such low levels of activity that they are regarded as being of negligible significance. It provides exemption from registration for keeping and use of insoluble solids whose activity does not exceed 0.4 becquerels/gram. It provides exclusion from authorization for accumulation and disposal of radioactive waste in the form of:

a. Insoluble solids whose activity on becoming waste does not exceed 0.4 becquerels/gram;

b. Organic liquids, radioactive solely because of the presence of carbon-14, tritium, or both, whose activity on becoming waste does not exceed 4 becquerels/milliliter; and

c. Gases containing radionuclides none of which, nor the decay products of which, has a half-life greater than 100 seconds.

There have been some UK **nuclear** projects where the site operators have made use of the Substances of Low Activity EO, with the agreement of HMIP, for the free release of scrap metals to the conventional UK scrap metal market. These include the disposal of aluminum from the gaseous diffusion enrichment plant operated by BNFL Capenhurst, and the disposal of steel from fuel flask transport wagons by AEA Technology, Winfrith on behalf of Nuclear Electric plc. Metal is also being recycled from the gas-cooled nuclear power station at Berkeley in Gloucestershire which is undergoing decommissioning. In such a case, HMIP expects the operator to make a proposal demonstrating that the items for free release can be adequately segregated from contaminated items, and that the items for free release can be demonstrated to be within the limits specified by the Order. Each proposal for a nuclear site is considered on its merits, including the operator's proposals for the mass of waste over which the activity concentration values should be calculated, and the methods used for monitoring and assessment.

The EO for **hospitals** applies to hospitals, nursing homes and similar establishments, as defined in the Order. It provides conditional exemption from registration for radioactive material kept for purposes of medical diagnosis, treatment of patients or supply to another hospital. It also gives conditional exemption from authorization in respect of the disposal from hospitals of wastes arising from the administration of very low doses of radioactive materials to patients. It therefore covers such things as waste from medical treatment, human excreta, articles which have contained radioactive substances used for medical treatment and residual ash arising from these wastes being incinerated.

Structure of Typical EO

The structure of a typical EO is:

a. Citation - how it should be referred to;

b. Application - where it comes into effect (England/Wales/ Scotland/Northern Ireland);

c. Interpretation - the meaning of the terms used in the EO (in the hospitals EO, for example, the meaning of the term "hospital" is very important);

d. Exemptions from registration for keeping and use of radioactive materials, exclusions from authorization for accumulation and disposal of radioactive waste, and the conditions which relate to these.

e. Earlier EOs revoked by the current EO, and commencement - that is, when it comes into effect.

The Future

The UK is involved in international work on exemptions and on the revision of the IAEA and European Community Basic Safety Standards. HMIP is also looking towards developing a risk-based approach against which current EOs can be reviewed and new ones made: this might favor unconditional exemption at an annual dose to any individual of less than 10 microsieverts, and conditional exemption at doses of a few tens of microsieverts.

CONCLUSION

Exemption Orders form one part of the UK's integrated system for regulating the use of radioactive materials and the disposal of radioactive wastes. EOs are kept under review and are amended as appropriate to ensure that they provide an appropriate level of regulation which is consistent with current radiological standards.

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